

Customer No.: 31561
Application No.: 10/710,405
Docket No.: 13302-US-PA

REMARKS

Present Status of the Application

The Office Action rejected claims 1-5, 7 under 35 U.S.C. 102(e), as being anticipated by Barth et al. (US 6,737,747). The Office Action rejected claims 27-30 and 32 under 35 U.S.C. 103(a), as being unpatentable over Barth et al. (US 6,737,747). The Office Action also rejected claims 6 and 31 under 35 U.S.C. 103(a) as being unpatentable over Barth in view of Edelstein (US 2005/0194619). The Office Action rejected claims 1, 4, 5, 7-8 under 35 U.S.C. 102(e), as being anticipated by Dalton et al. (US 6,734,096). The Office Action rejected claims 27, 29, 30, 32 and 33 under 35 U.S.C. 103(a), as being unpatentable over Dalton et al. (US 6,734,096). The Office Action also rejected claims 6 and 31 under 35 U.S.C. 103(a) as being unpatentable over Dalton in view of Edelstein. In particular, the office action stated claim 35 is allowable if rewritten in dependent form including all of the limitations of the bas claim and any intervening claims.

Applicants have amended claims 1 and 27 to more clearly define the present invention. After entry of the foregoing amendments, claims 1, 3-8 and 27-35 remain pending in the present application, and reconsideration of those claims is respectfully requested.

Rejection under 35 U.S.C 102 (e)

The Office Action rejected claims 1-5 and 7 under 35 U.S.C. 102(e), as being anticipated by Barth et al. (US 6,737,747). The Office Action rejected claims 1, 4, 5 and 7 under

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35 U.S.C. 102(e), as being anticipated by Dalton et al. (US 6,734,096). Applicant respectfully traverses the rejections for at least the reasons set forth below.

In order to properly anticipate Applicants' claimed invention under 35 U.S.C 102, each and every element of claim in issue must be found, "either expressly or inherently described, in a single prior art reference". "The identical invention must be shown in as complete details as is contained in the claim. Richardson v. Suzuki Motor Co., 868 F. 2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)." See M.P.E.P. 2131, 8th ed., 2001.

The present invention is in general related to a process of fabrication a semiconductor structure as claim 1 recites:

Claim 1. A process of fabrication a semiconductor structure, comprising:
providing a substrate;
forming a dielectric layer over the substrate;
forming a hydrophilic material layer over the dielectric layer to form a structure comprised of the substrate, the dielectric layer and the hydrophilic material layer, *wherein residuals are formed on at least one of a upper bevel of the structure, a lower bevel of the structure, a side wall of the structure and a combination thereof;*
performing a polish process on at least one of the upper bevel of the structure, the lower bevel of the structure, the side wall of the structure and a combination thereof to remove the residues; and
forming a hardmask layer over the hydrophilic material layer.

The office action stated the previously claims do not recite specifically what the residues are and a more specific definition as to where the polishing step us being performed. Applicant has amended claim 1 to specifically define where the residues are formed and where the polishing step is performed. In claim 1 of the present application, the residuals are formed on at least one of a upper bevel of the structure, a lower bevel of the structure, a side wall of the

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structure and a combination thereof, and the polish process is performed on at least one of the upper bevel of the structure, the lower bevel of the structure, the side wall of the structure and a combination thereof to remove the residues.

Barth discloses excess liner 114 and conductive material 115 may be removed in a CMP process, in which the top surface of conductor 115 is made coplanar with the hardmask layer 113. Hardmask layer 113 may serve as a polish-stop layer during this CMP step, thereby protecting ILD layer 112 from damage during polishing. Usually, the CMP process is a fully planarization process and thus the top surface of conductor 115 is made coplanar with the hardmask layer 113 (see col. 9, lines 34-40). Therefore, Barth fails to teach or suggest the polish process is performed on at least one of the upper bevel of the structure, the lower bevel of the structure, the side wall of the structure and a combination thereof to remove the residues. Therefore, Barth does not teach each and every element in claim 1.

In addition, Dalton teaches a method for forming a metal pattern in a dielectric layer. In particular, a CMP process is also conducted to remove the excess metal (see Fig. 2F-2G and col. 4, lines 40-50). Similarly, the CMP process disclosed by Dalton is performed on the top surface of the metal layer. The citation fails to teach or suggest the polish process is performed on at least one of the upper bevel of the structure, the lower bevel of the structure, the side wall of the structure and a combination thereof to remove the residues. Therefore, Dalton does not teach each and every element in claim 1.

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For at least the foregoing reasons, Applicants respectfully submit that independent claim 1 patently defines over the prior art references, and should be allowed. For at least the same reasons, dependent claims 3-5 and 7 patently define over the prior art as a matter of law.

Rejection under 35 U.S.C 103 (a)

Applicants respectfully traverse the rejection of claims 27-30 and 32 under 35 U.S.C. 103(a), as being unpatentable over Barth et al. (US 6,737,747) and the rejection of claims 27, 29, 30, 32 and 33 under 35 U.S.C. 103(a), as being unpatentable over Dalton et al. (US 6,734,096) because a prima facie case of obviousness has not been established by the Office Action.

To establish a prima facie case of obviousness under 35 U.S.C. 103(a), each of three requirements must be met. First, the reference or references, taken alone or combined, must teach or suggest each and every element in the claims. Second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skilled in the art, to combine the references in a manner resulting in the claimed invention. Third, a reasonable expectation of success must exist. Moreover, each of the three requirements must "be found in the prior art, and not be based on applicant's disclosure." See M.P.E.P. 2143, 8th ed., February 2003.

The present invention also provides a process of fabrication a semiconductor structure as claim 27 recites:

27. A process of fabrication a semiconductor structure, comprising:
providing a substrate;
forming a first dielectric layer over the substrate;
forming a first hydrophilic material layer over the first dielectric layer to form a first structure comprised of the substrate, the first dielectric layer and the first hydrophilic material

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layer, wherein *first residuals are formed on at least one of a upper bevel of the first structure, a lower bevel of the first structure, a side wall of the first structure and a combination thereof;*
performing a first polish process on at least one of the upper bevel of the first structure , the lower bevel of the first structure, the side wall of the first structure and a combination thereof to remove the first residues;
forming a first hardmask layer over the first hydrophilic material layer;
forming a second dielectric layer over the first hardmask layer;
forming a second hydrophilic material layer over the second dielectric layer to form a second structure comprised of the substrate, the first dielectric layer, the first hydrophilic material layer, the second dielectric layer and the second hydrophilic material layer, wherein *second first residuals are formed on at least one of a upper bevel of the second structure, a lower bevel of the second structure, a side wall of the second structure and a combination thereof;*
performing a second polish process on at least one of the upper bevel of the second structure, the lower bevel of the second structure, the side wall of the second structure and a combination thereof to remove the second residues; and
forming a second hardmask layer over the second hydrophilic material layer.

As discussed above, both Barth and Dalton teaches performing the CMP process on the entire surface of the layer(s) to remove the layer(s), but they do not teach or suggest that the polish process is performed on at least one of the upper bevel of the structure, the lower bevel of the structure, the side wall of the structure and a combination thereof to remove the residues. Therefore, the references, taken alone or combined, do not teach or suggest each and every element in claim 27. For at least the foregoing reasons, Applicants respectfully submit that independent claim 27 patently defines over the prior art references, and should be allowed. For at least the same reasons, dependent claims 27-30 and 32-33 patently define over the prior art as a matter of law.

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Applicants respectfully traverse the rejection of claims 6 and 31 under 103(a) as being unpatentable over Barth in view of Edelstein (US 2005/0194619) and the rejections of claims 6 and 31 under 35 U.S.C. 103(a) as being unpatentable over Dalton in view of Edelstein because a prima facie case of obviousness has not been established by the Office Action.

Applicant submits that, as disclosed above, Barth and Dalton fails to teach or suggest each and every element of claims 1 and 27 from which claims 6 and 31 depends. Edelstein also fails to teach or suggest the polish process is performed on at least one of the upper bevel of the structure, the lower bevel of the structure, the side wall of the structure and a combination thereof to remove the residues. Edelstein cannot cure the deficiencies of Barth and Dalton. Therefore, independent claims 1 and 27 are patentable over Barth/Dalton and Edelstein. For at the least the same reasons, their dependent claims 6 and 31 are also patentable as a matter of law.

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CONCLUSION

For at least the foregoing reasons, it is believed that the pending claims are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

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Respectfully submitted,

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